

Eye On Water – Australia

Part of a national approach for water quality assessment



CSIRO

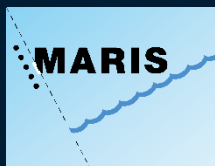
Oceans and Atmosphere

Janet Anstee, Nathan Drayson,
Hannelie Botha, Gemma Kerrisk, Phillip
Ford, Marlee Hutton & James McLaughlin



Geoscience Australia
Stephen Sagar

Vrije Universiteit, Amsterdam
Hans van der Woerd

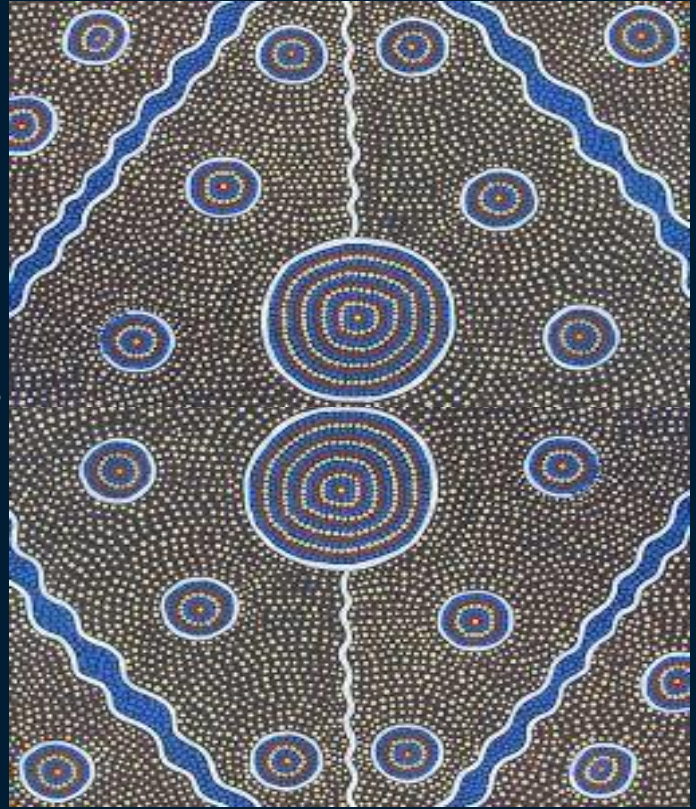


MARIS BV
Peter Thijsse



Acknowledgement of Country

- *I acknowledge Aboriginal and Torres Strait Islander peoples as the First Australians. I recognise their cultures, histories and diversity and their deep connection to the lands, waters and of this country.*
- *I especially acknowledge the Ngunnawal and Ngambri People, the Traditional Custodians of the land and waters where I am today and recognise these have always been places of sharing and learning.*
- *I wish to pay my respects to the First Nations Elders past, present and emerging.*

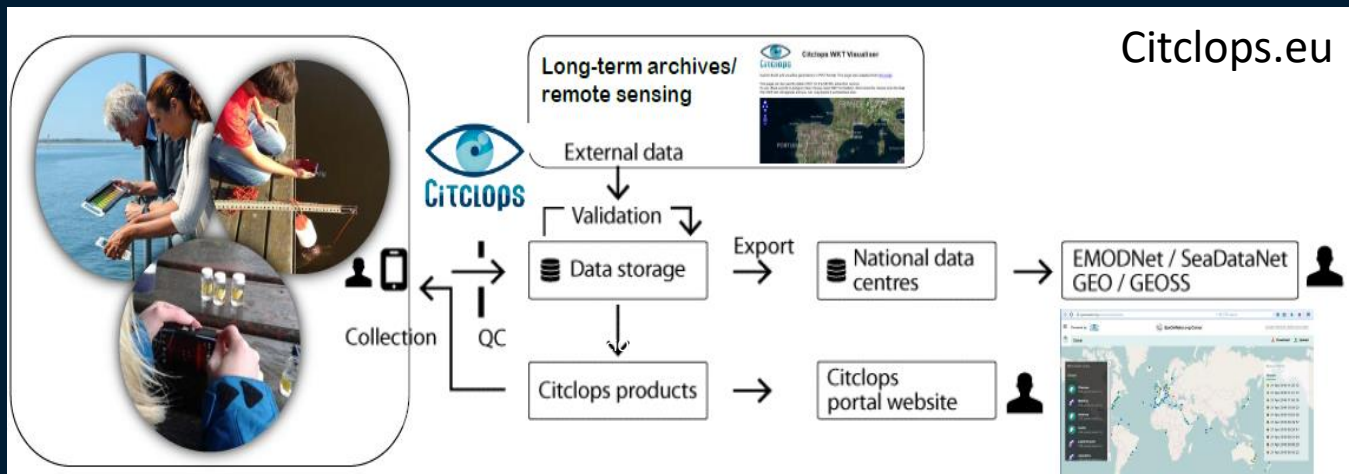


Author: Esther 1721 <https://pixabay.com/nl/users/esther1721-534895/>

Citizen Science Inspiration

European Project Citclops -> 2012 - 2015

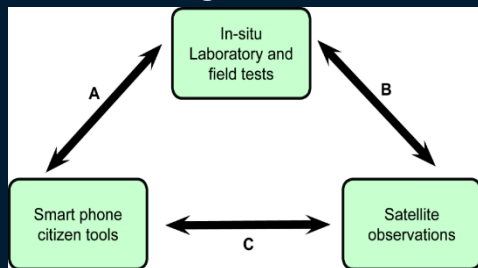
- Development of low cost optical tools
- Open access of data & storage
- Tools for different user groups
- Foster environmental science capacity
- Compatibility to in situ & remote sensing





Eye on Water Australia

- Project funded from DIIS Citizen Science funding and ran 2017-2020.
- Objective to establish network of citizen scientists.
- Target groups in locations where there is a paucity of in situ observations.
- Use the project to increase scientific knowledge about water quality.
- CSIRO will use these observations in monitoring water quality, calibrating satellite images.



Busch et al (2016)





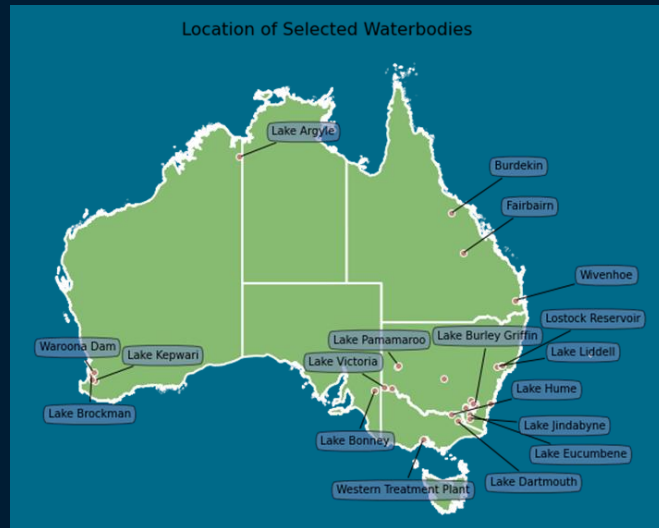
Inland Water Quality (IWQual) Project

Co-funded CSIRO and Geoscience Australia

PI: Janet Anstee

2019-2022

1. Analysis of knowledge gaps in archival bio-optical database (Botha et al, 2019) and target new acquisitions,
2. Database incorporating our historical and new acquisitions of *in situ* observation data,
3. Matchup data of *in situ* observations and satellite overpasses for validation,
4. Eye on Water water colour and other physio-chemical observations (Eye on Water – Australia app & db),
5. A physics-based (or ML training) algorithm for satellite-derived water quality assessment.





Natural Water Colours Variability





Water Quality Issues



Maclean River 18/1/2020
<https://www.theguardian.com>



Murray River – 12/2/2021: N. Drayson



Murray River Reserve at Burrowye
24/1/2020:
P. McInerney & G. Rees

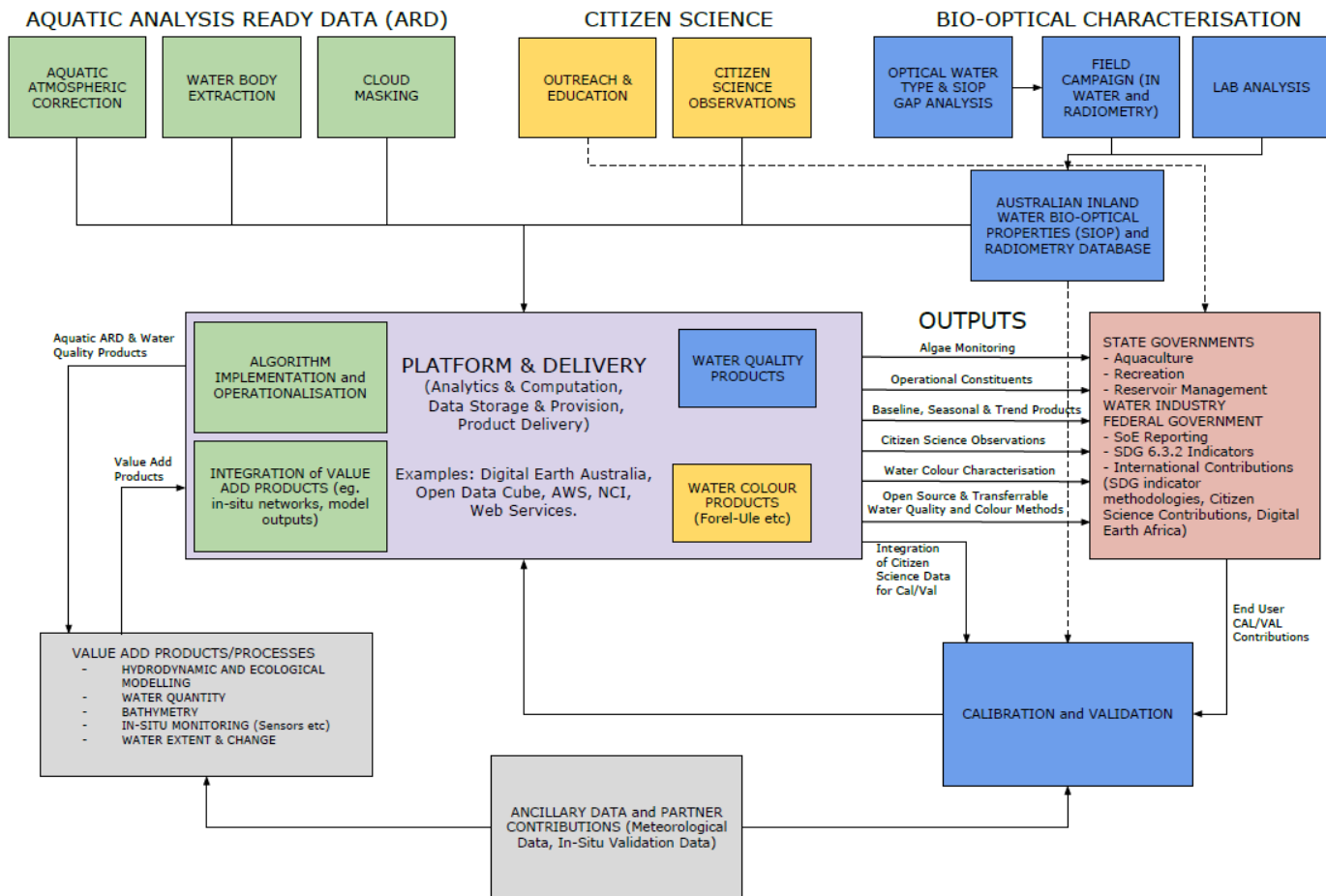


<https://www.abc.net.au>

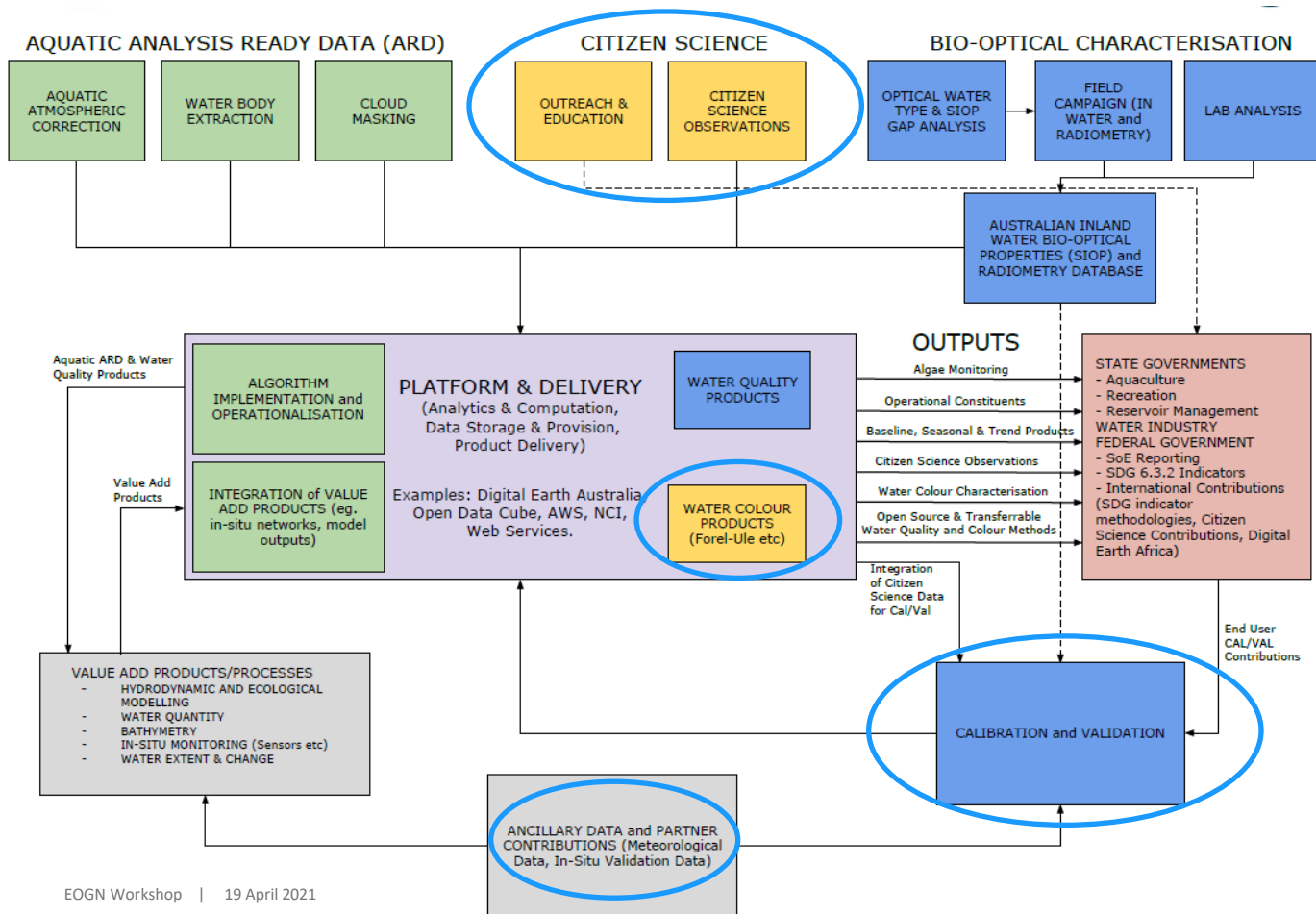


First ash flows at Uriarra Crossing, Murrumbidgee River, ACT 15/1/2020: J. Anstee

Aquatic Remote Sensing: Water Quality Framework



Aquatic Remote Sensing: Eye on Water Australia

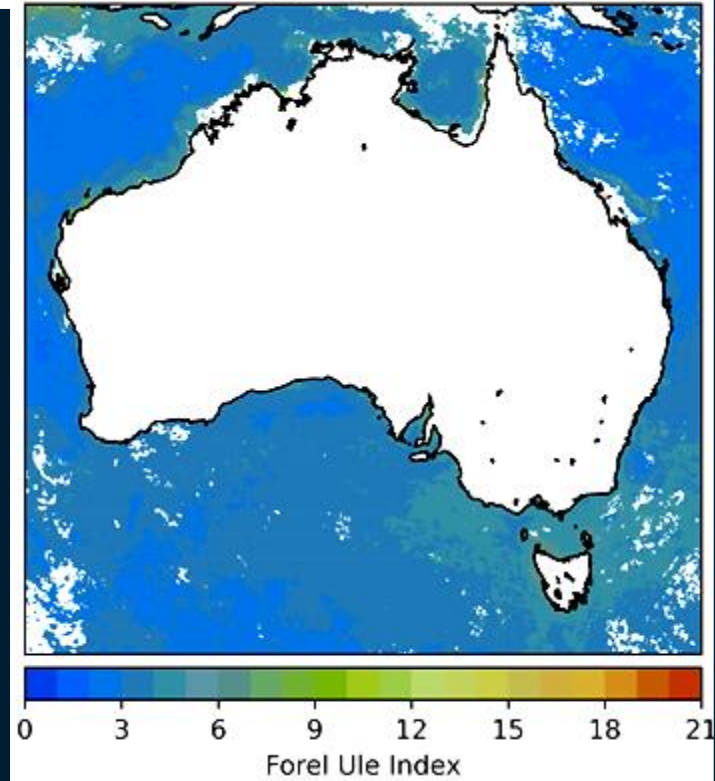




Eye on Water Australia Project Activities

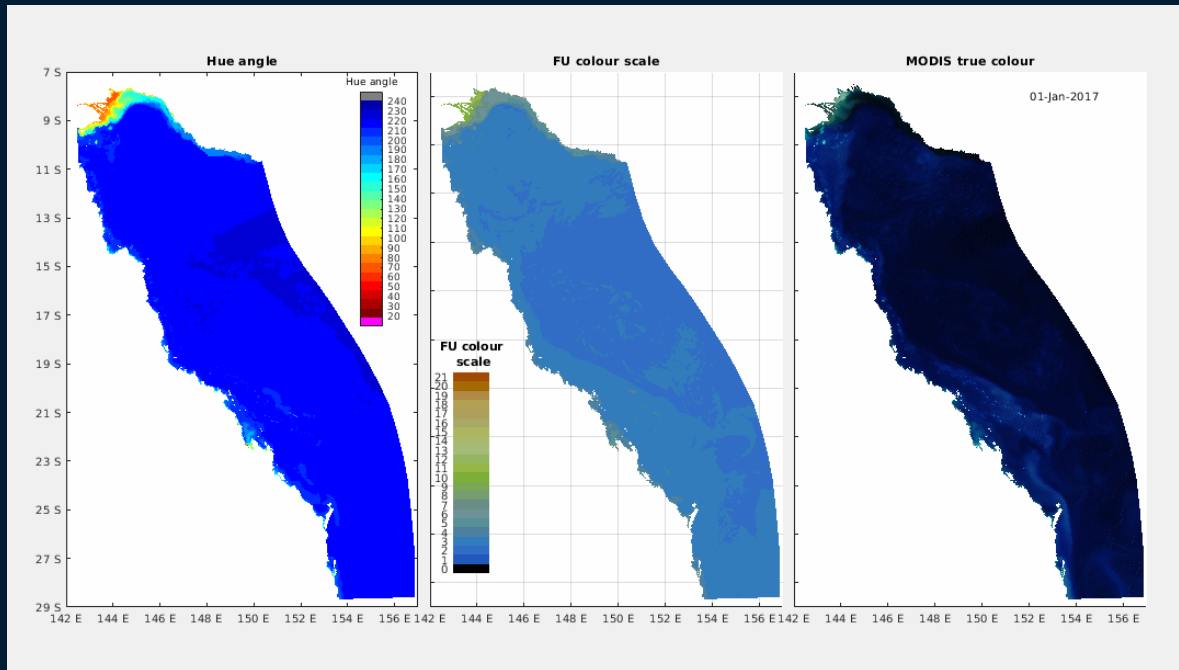
<https://research.csiro.au/eyeonwater>

MARIS BV graphic made from:
Pitarch, Jaime; van der Woerd, Hendrik J; Brewin, Robert J W; Zielinski, Oliver (2019): Twenty years of monthly global maps of Hue angle, Forel-Ule and Secchi disk depth, based on ESA-OC-CCI data. *PANGAEA*, <https://doi.org/10.1594/PANGAEA.904266>



The Forel Ule scale, a colour comparator scale described recently by Wernand and van der Woerd, *J. Europ. Opt. Soc. Rap. Public.* 10014s Vol 5 (2010),
[doi:10.2971/jeos.2010.10014s](https://doi.org/10.2971/jeos.2010.10014s)

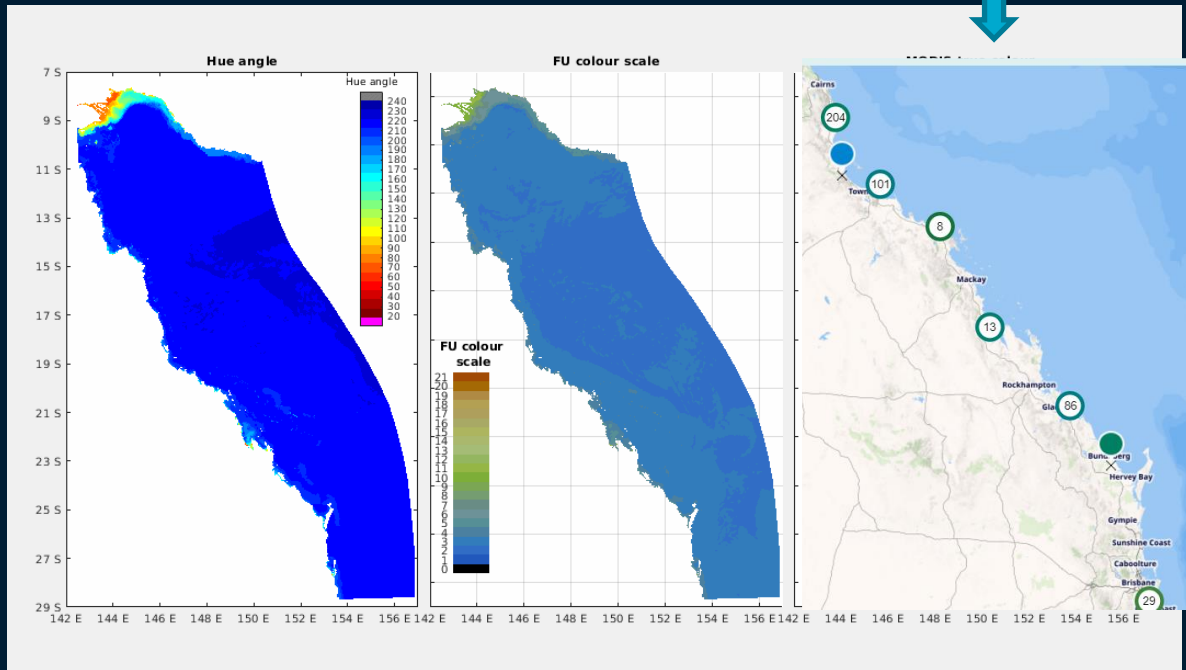
Biogeochemical Model Outputs (eReefs)



Great Barrier Reef Model output from Mark Baird (CSIRO)
<https://research.csiro.au/ereefs/models/>

Biogeochemical Model Outputs (eReefs)

EoW data

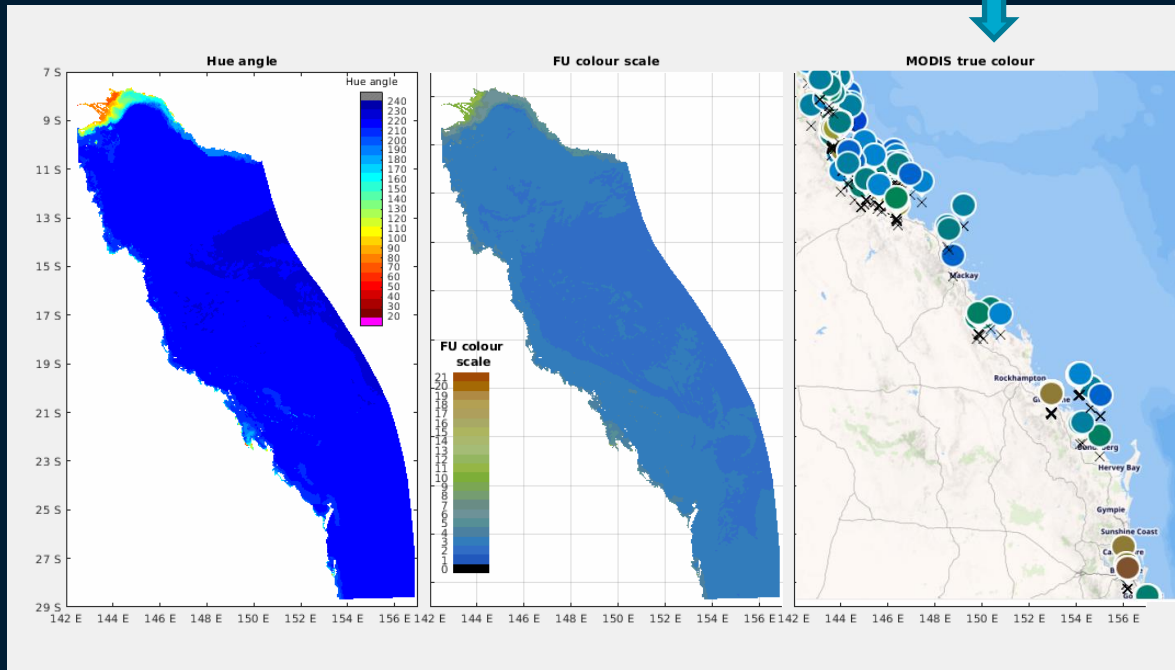


Great Barrier Reef Model output from Mark Baird (CSIRO)

<https://research.csiro.au/ereefs/models/>

Biogeochemical Model Outputs (eReefs)

EoW data



Great Barrier Reef Model output from Mark Baird (CSIRO)

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Satellite Overpass Notifications

- L8 and S2A/B satellite overpass prediction
- User has to 'opt-in'
- User has to select 'home location'
- When activated user will receive a notification 24 hrs in advance when you could best go out in the field to observe around the 'home location'

A screenshot of a mobile application's 'Edit Profile' screen. The status bar at the top shows the time 7:16, signal strength, and battery level. The screen has a white background with a dark teal header bar. A hamburger menu icon is on the left, and the title 'Edit Profile' is on the right. The form contains several fields: 'Nickname' with the value 'Jmaze', 'Display nickname' with a toggle switch turned on, 'Satellite Overpass Notifi...' with a toggle switch turned on, and a link 'More about overpasses here'. Below these are fields for 'Nearest Large City' (Canberra), 'State' (ACT), 'Country' (Australia), and a red 'Delete Account' button. At the bottom is a dark teal 'Save Changes' button.

7:16

≡ Edit Profile

Nickname
Jmaze

Display nickname ☒

Satellite Overpass Notifi... ☒

More about overpasses [here](#)

Nearest Large City
Canberra

State
ACT

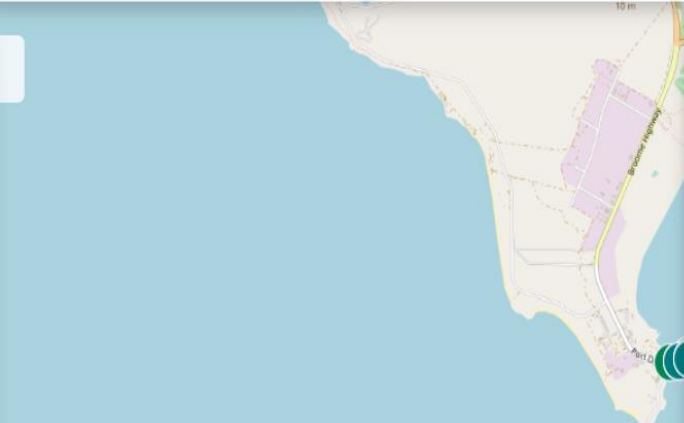
Country
Australia

Delete Account

Save Changes

Eye On Water: Australia - WFS Viewer

737	244	iPhone8,1@258	16@137	11.84	N/A	541	440
iPhones	Androids	Most Used Device	Most Reported FU	Average FU	Most Active User	EyeOnWater Australia	EyeOnWater: Worldwide



Measurement details: ✕

40 iPhones **1** Androids **iPhone10,2@22** Most Used Device **5@24** Most Reported FU

5.93 Average FU **N/A** Most Active User **40** EyeOnWater Australia **1** EyeOnWater: Worldwide

Device: iPad4,2

Less details

FU value: 5
Date: 09/05/2018 03:58 +10:00
Device: iPad4,2

Lon, Lat	122.2131923028475, -18.0029780650679		
Device	iOS	Model	iPad4,2
Viewing angle	15	Raining?	See bottom?
FU Value	5	Observed	Processed 3
PH	7.7	Conductivity	3999
Cloud cover	-1	Secchi depth	

More details

Measurement details:



14.80



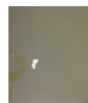
Device: SM-G930F



FU value: 16
Date: 03/02/2017 11:05 +11:00
Device: SM-G930F

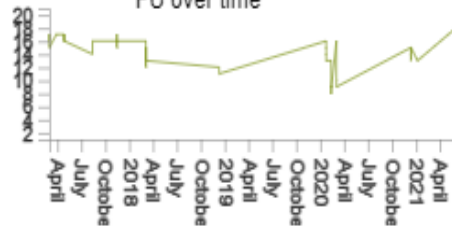


FU value: 12
Date: 03/06/2018 11:45 +11:00
Device: iPhone10,2

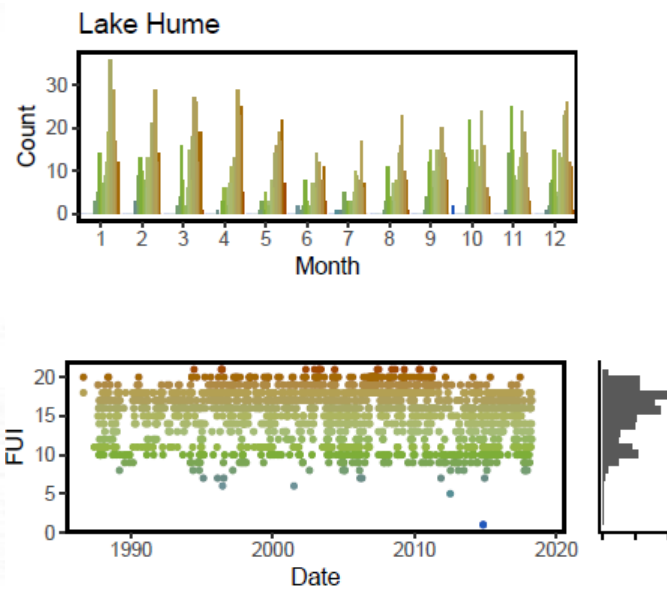
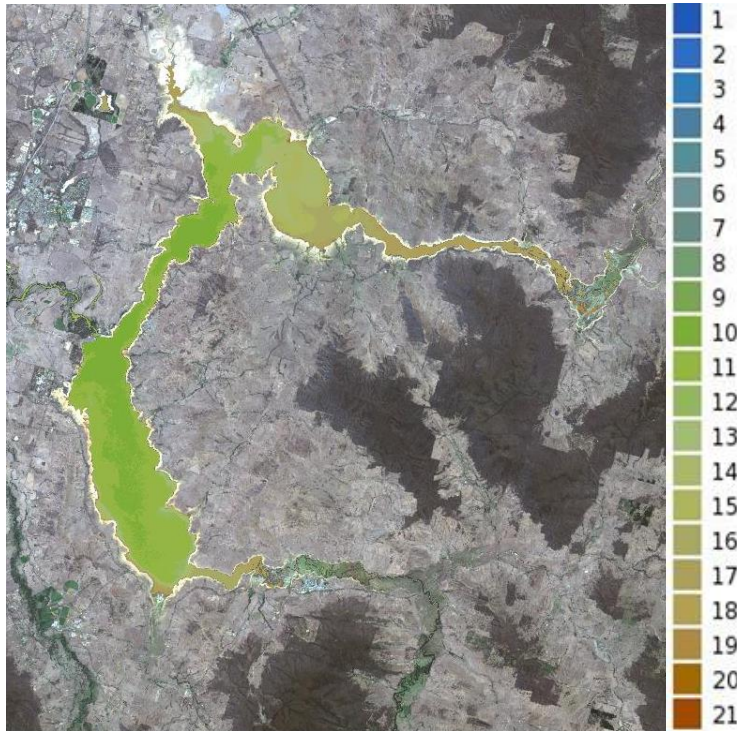


FU value: 16
Date: 04/28/2017 10:25 +10:00
Device: iPhone5,2

FU over time



Time series of water colour -validation

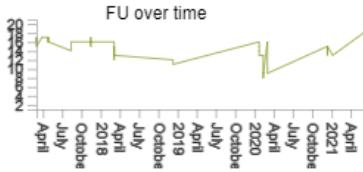


From Botha EJ, Anstee JM and Lehmann E (2019)

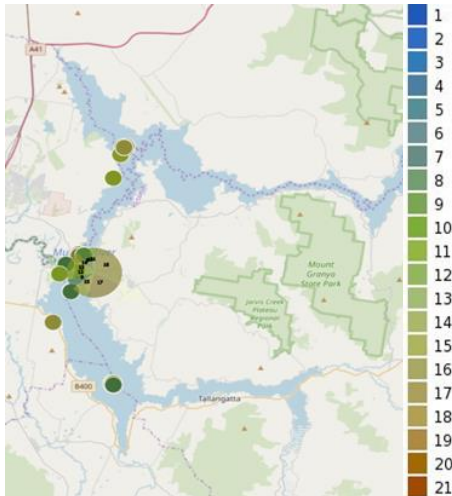
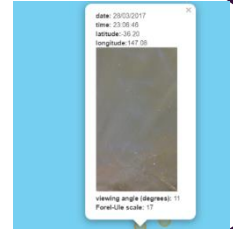
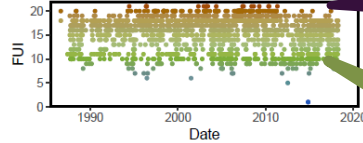


Time series of water colour -validation

Eye on Water Australia



Landsat FUJ time series





Protocols and User Guides

<https://research.csiro.au/eyeonwater/user-guide/>

<https://youtu.be/fOiGgrDMU6U>

<https://youtu.be/qZfdNAhXI1E>

User Guide

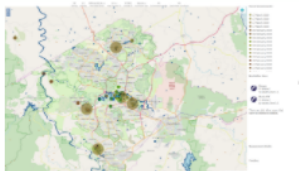
Your user account

You can create a user account in the App by clicking on "Create account" on the upper right corner of the screen. After logging in you will see your nickname on the upper left of the screen. You can click on "add device" to connect your mobile device to your account by scanning a QR-code.

Most active data collectors can upgrade themselves from Jolly Jellyfish to Neptune. Every correct photo you send will generate 10 points. You level up when reaching the following number of points:

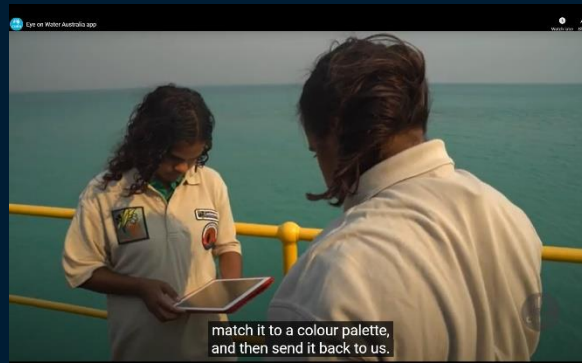
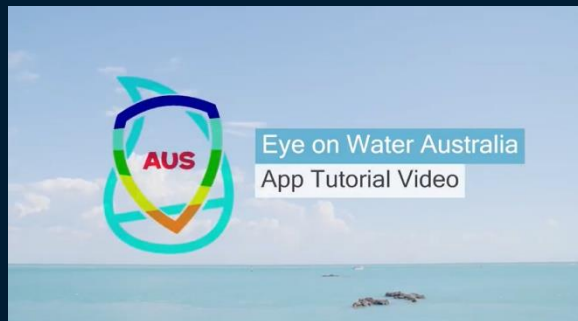
1. < 100, title: Jolly Jellyfish
2. 100+, title: Staggering Seahorse
3. 250+, title: Tailspin Turtle
4. 500+, title: Dorky Dolphin
5. 1000+, title: Wandering Whale
6. 2500+, title: Mesmerizing Mermaid
7. 5000+, title: Neptune a.k.a. 'the King'

The map of observations



The normal Eye On Water map view shows the data points in the location they were taken. In the sidebar on the right, the initial view shows recent measurements and the list of active users.

- Clicking on a data point (which may include multiple other data points that sit at the same location) pulls up information in the sidebar about that / those point(s).
- Clicking on a pie chart shows a pie chart for all data points within the water body and a graph of the EU





User Quiz



Question 3

Is this a good picture?



Yes

No

8:39



Good answer!

This is not a good picture because
you can see the bottom.

We recommend to go deeper in the
water and take a picture where you
can't see the bottom.

Next question



Eye on Water Indigenous Engagement

KIMBERLEY RANGER NETWORK

HOME > LAND & SEA > KIMBERLEY RANGER NETWORK





Engaging citizen scientists

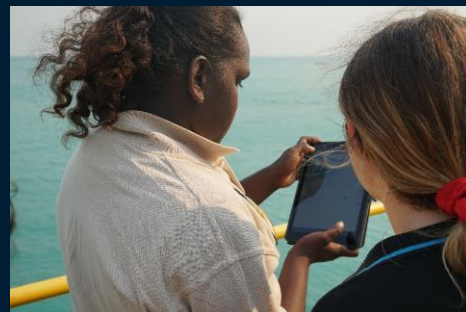
<  Parks and Wildlife Kimberley
Friday at 11:50 am · 🌐

The Broome Senior High School Bush Ranger cadets have been amongst the first to try out the new Eye on Water Australia citizen science app. Under the guidance of CSIRO marine scientist and local Bardi woman, Marlee Hutton, the students sampled the water quality at Town Beach last Wednesday.

The app is freely available on ios and Android, with all data recorded to a national database.



- Broome Senior High School
- St Mary's High School
- Holy Rosary Primary School Derby
- Fitzroy Valley District High School

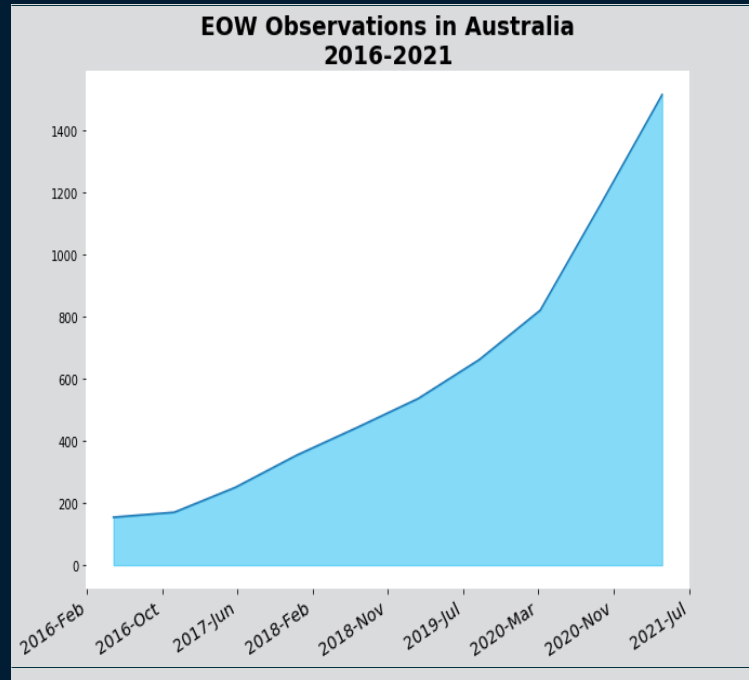


- Secchi depth,
- pH,
- Temperature
- Conductivity
- DO
- Chl-a or Phycocyanin
- Macrophytes



End Results...so far

- Increase user uptake and national coverage
- Enhancements to :
- Quality control (quiz, videos, website)
- Increased matchups (push notifications)
- Still need work on visualising the EoW data/WMS
- Maintaining website, newsletter and database
- Funding for continuity!





Thank you

CSIRO Oceans and Atmosphere

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w <http://people.csiro.au/A/J/Janet-Anstee>

